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Priming third-party ostracism does not lead to increased affiliation in three Serbian communities

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ABSTRACT

Young children rely on establishing and maintaining social relationships. As a consequence, social exclusion poses a significant threat that should be avoided actively. Previous research reports that children react to ostracism with an increased tendency to affiliate. For example, they draw more affiliative pictures and engage in more faithful (over)imitation following primes depicting social exclusion. However, all prior studies to date tested this effect in children from strongly socially independent societies, emphasizing individual freedom and psychological autonomy. The current study tested whether these effects also occur among children growing up in a society where social interdependence is emphasized more strongly. We assessed affiliative reactions to video primes depicting either third-party ostracism or control stimuli among 128 preschoolers (M_{age} = 4.73 years) from an urban community (Belgrade), a semi-urban community (Pozarevac), and a rural community (Kostolac) in Serbia. Across communities, children detected ostracism when it was depicted in the priming stimuli. However, children neither drew more affiliative pictures nor engaged in more faithful overimitation following primes depicting ostracism as compared with control stimuli. The two measures for affiliation (i.e., affiliative drawings and increased overimitation) were not linked on an individual level. Although these results suggest that young children from diverse societies are capable of recognizing

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third-party social exclusion, their response to such information is strongly shaped by cultural values on social interdependence.

Introduction

For humans across the globe, establishing and maintaining social relationships is of critical importance. Doing so is particularly relevant for young children because they inevitably rely on others to provide them with security and opportunities for social learning. Thus, it is no wonder that already young children possess a specialized set of motivations and skills that support the establishment and maintenance of social bonds with others (Baumeister & Leary, 1995; Chevallier, Kohls, Troiani, Brodkin, & Schultz, 2012; Over, 2016).

Given this fundamental importance of social relationships, ostracism—the process of social exclusion and rejection by others (Williams, 1997)—constitutes a major threat for individuals because it blocks access to the benefits provided by others. Accordingly, humans have evolved behavioral tendencies preventing and reducing social exclusion (Over, 2016). For example, already preschool-aged children conform to peers (Haun & Tomasello, 2011), manage their reputation (Engelmann, Herrmann, & Tomasello, 2012; Engelmann, Over, Herrmann, & Tomasello, 2013; Rapp, Engelmann, Herrmann, & Tomasello, 2019), and act prosocially and loyally toward ingroup members (Engelmann, Herrmann, & Tomasello, 2018; Misch, Over, & Carpenter, 2016; Over, 2018; Sierksma, Spaltman, & Lansu, 2019).

Even the mere observation of social exclusion has been shown to encourage affiliative behaviors in young children. In their seminal study, Over and Carpenter (2009) primed 5-year-old children from an urban German community with third-party ostracism by showing them short videos in which a group of animated shapes excluded another shape from joint movements. In the control setup, children watched videos with similar features but lacking social exclusion. Following this manipulation, children watched the adult experimenter perform a sequence of causally irrelevant actions on a transparent puzzle box before switching on a light on top of this box. Children were given the chance to switch on the light themselves, leaving open whether or not to copy the sequence of actions as modeled by the experimenter. The researchers found that children copied the model at higher rates after being primed with ostracism as compared with control videos. They concluded that children's imitative behaviors serve an affiliative function strengthening the relationship between the model and the imitator (Over & Carpenter, 2012, 2013).

A conceptual replication for this finding comes from another study using similar stimuli to manipulate third-party ostracism (Watson-Jones, Legare, Whitehouse, & Clegg, 2014). Here, 3–6-year-old children from an urban U.S. community copied an adult model at higher rates after being exposed to videos showing third-party ostracism as compared with affiliation. This tendency was particularly pronounced if the sequence of actions modeled was mostly conventional (e.g., not causing an effect). Interestingly, children also show increased imitation after experiencing social exclusion themselves in a social endeavor (Watson-Jones, Whitehouse, & Legare, 2016), suggesting that third-party social exclusion actuates similar affiliative responses as direct experience of such.

One expression of imitation that has gained particular interest as a proxy for children's affiliative motivations is their overimitation (Marsh, Ropar, & Hamilton, 2019; Over & Carpenter, 2013; Stengelin, Hepach, & Haun, 2019), defined as the imitation of causally irrelevant actions (Horner & Whiten, 2005; Lyons, Young, & Keil, 2007). In a typical overimitation paradigm, a model performs a series of causally irrelevant actions on a puzzle box before retrieving a reward from it (Horner & Whiten, 2005; Nielsen & Tomaselli, 2010). From their second year of life onward, children start to copy even those actions that are visibly causally irrelevant for achieving the instrumental goal of obtaining the reward (Nielsen, 2006; see Hoehl et al., 2019, for a review). Given that children's overimitation is enhanced by the social presence of the model (Nielsen & Blank, 2011; Marsh et al., 2019; Stengelin

et al., 2019), and because their overimitation is linked to their reported extraversion (Hilbrink, Sakkalou, Ellis-Davies, Fowler, & Gattis, 2013), researchers have argued that overimitation forms a "social glue" fostering affiliation between model and imitator (Nielsen, 2018).

Song, Over, and Carpenter (2015) introduced another method to assess children's increased affiliation following ostracism. In their study, preschoolers from an urban German community were asked to draw a picture of themselves and a friend after they were primed with either videos depicting third-party ostracism or control videos. As a proxy for children's affiliative motivation, the researchers assessed the spatial distance between the two figures in children's drawings, with higher proximity indicating an increased need for affiliation. Children primed with ostracism drew more affiliative pictures depicting closer relationships between them and their friends as compared with children in the control group. In another study, 4- and 5-year-old children from an urban German community sought affiliation with an adult experimenter by sitting closer to her after being primed with third-party ostracism as compared with control videos (Marinović, Wahl, & Träuble, 2017).

Taken together, this strand of research suggests that children tend to respond with increased affiliation when being exposed to social exclusion. However, past research almost exclusively relied on data obtained among children from urban Western populations. Given the importance of culture to almost any aspect of human psychology, generalizing from these studies to child development more broadly would be at best shortsighted and egocentric (Bornstein, 2012; Keller, 2007; Nielsen, Haun, Kärtner, & Legare, 2017).

One of the cultural variables that may be critical in this regard is that of *social interdependence* (Uskul & Over, 2017; see also Hofstede, 1980; Markus & Kitayama, 1991; Triandis, 1989). Accordingly, individuals growing up in an environment where the self is construed as socially interdependent are typically embedded in a dense network of social relationships. In societies emphasizing social interdependence, social relationships constitute a central socialization goal and are given priority over psychological autonomy (Keller, 2007). Children socialized in environments endorsing social interdependence may perceive social exclusion as less threatening than their counterparts from more independent populations because their existing networks of social relationships offer sufficient security and protection (Over & Uskul, 2016; Pfundmair et al., 2015; Ren, Wesselmann, & Williams, 2013; see Uskul & Over, 2017, for an overview).

First support for this notion came from a study by Pfundmair et al. (2015), who reported systematic cross-cultural variation in adults' responses to ostracism. In this study, adults from socially independent Germany were more negatively affected by the experience of social exclusion than adults from more socially interdependent societies such as India, China, and Turkey. German adults reported a pronounced decrease in the fulfillment of their basic psychological needs, such as belonging and self-esteem, following the experience of ostracism. Interestingly, their counterparts from the more socially interdependent societies reacted to a much lesser extent to ostracism manipulations. This pattern was also observed on a physiological level; (socially independent) Germans showed an increased heart rate following the experience of ostracism, whereas adults from (socially interdependent) China did not show such a response. Further evidence in support of these results stems from a study by Ren et al. (2013), who linked the self-construals (e.g., socially independent vs. interdependent) of Chinese university students to their reactions toward ostracism imputed through an online ball-tossing game. The more participants identified themselves as being socially interdependent, the better they recovered from experiencing ostracism in the game. Given these studies, it appears that the degree to which people are affected negatively by ostracism varies with the importance ascribed to socially interdependent and independent cultural values.

Although these studies suggest cultural variation in adults' reactions to ostracism alongside societal emphases regarding social interdependence, the ontogenetic roots of this link are still largely unclear. This constitutes an important issue to be addressed through developmental research designs (Liebal & Haun, 2018; Nielsen & Haun, 2016). To investigate the ontogenetic roots of ostracism and its' potential interplay with cultural values on social interdependence, early to middle childhood marks a crucial period. During the preschool years, peer interactions become increasingly important for young children (Brownell, Ramani, & Zerwas, 2006) and increase in frequency as children spend their time in institutionalized day care and education. In consequence, children become increasingly sensitive to group processes, including social inclusion and ostracism (Over & Carpenter, 2009; Toppe,

Hardecker, & Haun, 2020; Watson-Jones et al., 2016). At the same time, children consolidate important psychological traits that enable them to adopt the peculiarities of their cultural environment. For example, they increasingly rely on overimitation and other strategies of social learning that are argued to strengthen affiliation within their cultural group (Clay, Over, & Tennie, 2018; Stengelin et al., 2019; van Leeuwen et al., 2018).

Initial evidence suggesting that social interdependence shapes children's reactions to ostracism from early in development was reported by Over and Uskul (2016). In a set of four studies, the researchers assessed 3–8-year-old children's responses and evaluations of social exclusion in two communities varying in their cultural emphasis on social interdependence. Children from a socially interdependent farming community in Turkey were less likely to report social pain as a response to stimuli depicting third-party social exclusion than their counterparts from a socially independent herding community. That is, children from the farming community rated the mood of an excluded protagonist as more positive than their counterparts from the herding community. Furthermore, within each community, variation in parents' emphasis on social interdependence mediated children's responses (e.g., perceived social pain). Following this study, children growing up in urban Western societies emphasizing social independence (Keller & Kärtner, 2013) may be particularly vulnerable to the threat of ostracism given that their self-construals rely on a limited set of potential interaction partners. In line with this notion, past research detected affiliative reactions among children from societies valuing social independence (see above). Assessing children from such contexts may, in turn, have led to a potentially erroneous conclusion that a strong affiliative motivation following social exclusion is both robust and cross-culturally recurrent. In more socially interdependent societies, children may be better equipped to perceive their social environment as stable, which is why these children may be less inclined to perceive ostracism as threatening.

Although the investigation of Over and Uskul (2016) provides initial support for the notion of social interdependence as a protective factor in children's reactions to social exclusion (e.g., perceived social pain), it remains unclear to what degree children's own *affiliative behaviors* are also shaped accordingly (Over & Carpenter, 2009; Song et al., 2015; Watson-Jones et al., 2016). The inducing effect of ostracism on affiliative behaviors has mostly been theorized as a "fundamental process for humans" (White et al., 2016, p. 2) with reference to the importance ascribed to social interactions in human phylogeny and ontogeny. Assessing the degree to which this link can be generalized outside socially independent Western societies is critical to validate such claims. If the universalists' assumptions would hold true, one would assume that children from socially interdependent societies would react to ostracism with an increased drive to affiliate as well. If so, this would indicate that children from socially interdependent societies would buffer themselves from the negative consequences of social exclusion by relying on social support from others (see Study 3 in Over & Uskul, 2016). In consequence, one would expect these children to show a strong tendency to affiliate after being primed with ostracism.

Contrasting findings would raise serious doubt about such generalizations beyond socially independent Western societies. If children from socially interdependent contexts would show little or no affiliative response to stimuli depicting third-party ostracism, one may speculate that such stimuli convey a minor threat to children from these societies. Such findings would emphasize the importance of overcoming the current Western-oriented sampling bias in developmental psychology (Nielsen et al., 2017) in favor of a more representative assessment of the role of culture in shaping early child development.

Moreover, the degree to which other contextual factors, such as urbanization, contribute to children's reactions toward ostracism is yet unclear. Children growing up in a rural environment may react differently to the threat of ostracism than those growing up in an urban area due to, for example, differences in the availability of social relationships. Finally, it is yet unclear to what extent the various behavioral proxies for children's affiliation, such as their imitation and drawings, share a common trait-like disposition. For example, children's overimitation may reflect mechanisms other than a mere affiliative drive. Some scholars have emphasized cognitive bias (Lyons et al., 2007), normative bias (Keupp, Behne, & Rakoczy, 2013), and conformity bias (DiYanni, Corriveau, Kurkul, Nasrini, & Nini, 2015) to underlie children's overimitation (see Hoehl et al., 2019, for a review). Thus, whether different proxies for children's affiliation are linked on an individual level is essential to assess the construct validity of these measures (Chevallier et al., 2012; Stengelin et al., 2019).

To address these questions, we replicated and extended the study by Song et al. (2015) in three Serbian communities varying in their community sizes (urban Belgrade vs. semi-urban Pozarevac vs. rural Kostolac). We examined 3–5-year-old children's affiliative responses to priming stimuli depicting either ostracism (ostracism condition) or no ostracism (control condition). Following this priming phase, we (a) assessed children's affiliative drawings (see Song et al., 2015), (b) investigated children's tendency to overimitate an adult model (see Stengelin et al., 2019), and (c) related these behaviors to each other to assess whether they reflect a common construct.

We chose to conduct the study in Serbia given that Serbian culture puts a much stronger emphasis on social interdependence as compared with Western societies (e.g., individualism rate of 25% in Serbia vs. 67% in Germany; Hofstede, Hofstede, & Minkov, 2010). Collectivistic attitudes, loyalty, and social ties are highly valued in Serbian communities. For example, interpersonal relatedness within family structures is considered important (Bolčić, & Milić, 2002; Pantovic, Dunjic-Kostic, Ivkovic, Damjanovic, & Jovanovic, 2012). The collapse of social and state institutions during the 1990s gave rise to new "family unions" and "family-friendly, neighborhood-native and collegial-business informal networks, and connections" (Bolčić & Milić, 2002, p. 11). Due to economic growth and recent political changes (i.e., accession negotiations with the European Union), Serbian culture is currently shifting toward a greater emphasis on social independence. It has been proposed that this shift is most prominent among the urban areas of the capital Belgrade (Podrug, Filipović, & Stančić, 2014). This notion is in line with research suggesting a positive association between cultural emphasizes on individualism and urbanization (Cha, 1994; Freeman, 1997; Georgas, 1989). By comparing Serbian communities varying in their community sizes, we aimed at testing the link between ostracism and affiliation in a society that is currently underrepresented in psychological research while ensuring cultural variation in interdependent values (see also Frick, Clément, & Gruber, 2017).

Urban Belgrade is the capital and the industrial and cultural hub of Serbia, with about 1,690,000 inhabitants (Center for Study in Cultural Development, 2020), with 2.7 people living in an average household. The rate of people with degrees in higher education is high (nearly 30%), whereas about 10% of households are reported to at risk for poverty. The average household size in semi-urban Pozarevac, with its 59,000 inhabitants, is 3.0 people (Center for Study in Cultural Development, 2020). Here, about 15% of people hold degrees in higher education, whereas 16% of households are at risk for poverty. Rural Kostolac is a community with about 13,000 inhabitants. The average household size in this community is 3.3 people (Center for Study in Cultural Development, 2020). About 8% of inhabitants in Kostolac hold degrees in higher education, whereas about 27% of households are at risk for poverty.

Based on previous research, we predicted that preschoolers across the three diverse Serbian communities would show fewer, if any, affiliative responses to social exclusion as compared with previous studies conducted among urban Western participants (see https://osf.io/gq7vt?view_only=2ff6bbc5d81744d0b3c2306442bc0306 for preregistration). We further expected stronger effects of primes depicting ostracism on both (a) children's affiliative drawings and (b) their overimitation among children from urban Belgrade as compared with their counterparts from semi-urban Pozarevac and rural Kostolac given the link between urbanization and social independence. Following Song et al. (2015), we predicted that older children would draw more affiliative pictures in the ostracism condition as compared with the control condition (i.e., higher proximity between agents and more social elements drawn). Finally, we expected a positive link between both measures of children's affiliation, with children drawing more affiliative pictures (e.g., high proximity between figures) also showing overimitation at higher rates.

Method

Participants

The final sample consisted of 128 children (M_{age} = 4.73 years, range = 3.66–5.60) from the three Serbian communities ($n_{Belgrade}$ = 37, 16 boys; $n_{Pozarevac}$ = 46, 23 boys; $n_{Kostolac}$ = 45, 23 boys). All children were assessed in their day-care institutions following an opportunity sampling approach in which we aimed at testing about 20 children per community and condition. In Belgrade, we tested children across five different day-care institutions ($n_{Belgrade\ 1}$ = 13; $n_{Belgrade\ 2}$ = 6; $n_{Belgrade\ 3}$ = 7; $n_{Belgrade\ 4}$ = 4; $n_{Belgrade\ 5}$ = 7). In Pozarevac, we tested children in three day-care institutions ($n_{Pozarevac\ 1}$ = 14;

$n_{\text{Pozarevac 2}} = 23$; $n_{\text{Pozarevac 3}} = 9$). In Kostolac, all 45 children attended the same day-care institution. The institutions in Pozarevac and Kostolac grouped about 25 children together with two adult caregivers. Children were assigned to these groups according to their ages (4.0–4.5 years, 4.5–5.0 years, etc.). Here, children's daily routines involved a shared breakfast, followed by intervals of free play and educational input (learning to count, learning the alphabet, etc.), resting time, and lunch. Three of the day-care institutions in Belgrade implemented a similar concept. For two smaller institutions in Belgrade, children's groups were organized regardless of age. Here, children's daily routines were mostly similar but further emphasized educational activities involving arts, theater, and music more selectively.

An additional 2 children were tested but excluded from further analyses because they were above the age threshold of 6 years. Another 4 children were initially tested but excluded from the statistical analyses because they declined to participate in both the drawing task and overimitation task. Data for a further 10 children were partially analyzed because these children did not want to participate in one of the two tasks ($n = 2$ for the drawing task; $n = 2$ for the overimitation task), because they composed their drawing in a portrait format instead of a landscape format ($n = 3$), or because their drawings were not codable (e.g., figures not identifiable) ($n = 3$). Data of these children were included to assess their comprehension of the video stimuli and their judgments of their own mood and that of the video protagonists.

Written consents of parents and day-care administrations were obtained prior to the study. Children's participation was strictly voluntary. All legal requirements of the host country were followed throughout the study, and the study design was approved by the institutional review board at the medical faculty of Leipzig University.

Design and materials

In a between-participants design, children were randomly assigned to either the ostracism condition ($n_{\text{Belgrade ostracism}} = 19$; $n_{\text{Pozarevac ostracism}} = 23$; $n_{\textit{Kostolac ostracism}} = 23$) or the control condition ($n_{\text{Belgrade control}} = 18$; $n_{\text{Pozarevac control}} = 23$; $n_{\textit{Kostolac control}} = 22$). Priming videos lasted approximately 1 min and were identical to those used in the study by Song et al. (2015; see also Marinović et al., 2017). In both conditions, children were tested by an adult female experimenter (henceforth "E"), who invited them to watch two videos on a 15.6-inch laptop screen in which a group of shapes moved around on the screen. In the ostracism condition, videos depicted a shape repeatedly approaching a group of shapes but being excluded by them. In the control condition, no ostracism was depicted as the single protagonists did not approach the group of shapes but moved separately from those on the screen. Other factors (e.g., object sizes, movement patterns, length of videos) were held constant across conditions (see Song et al., 2015, for a detailed description of the stimuli).

To assess children's emotional reactions to the priming videos, we again replicated the study by Song et al. (2015) by using a Likert scale with five emoticons. Following the original study, children then participated in a drawing task using identical materials and protocols as in the original study (Song et al., 2015). Here, children were asked to draw themselves and a friend on a paper sheet (15×23 cm) in landscape orientation using a green pen.

Finally, to assess a second proxy for affiliation (Nielsen & Blank, 2011; Over & Carpenter, 2009; Stengelin et al., 2019; Watson-Jones et al., 2016), children were tested in an overimitation paradigm. For this purpose, we implemented the protocol and materials introduced by Stengelin et al. (2019). Children engaged with a semi-transparent puzzle box with a blue wooden stick placed at the top hole of the box (see Fig. 1 for an illustration of the procedure).

The stimuli and instructions of the drawing task were an exact replication of the study by Song et al. (2015). The script was translated from English to Serbian by a native Serbian speaker and was independently translated back into English by another native speaker. Both translations were then compared. Differences were minor, and both translators agreed to the final instructions.

Procedure

Priming phase

E addressed each participating child in the day-care institution and asked whether the child wanted to join her in playing some games in a separate room. In the testing room, E asked the child

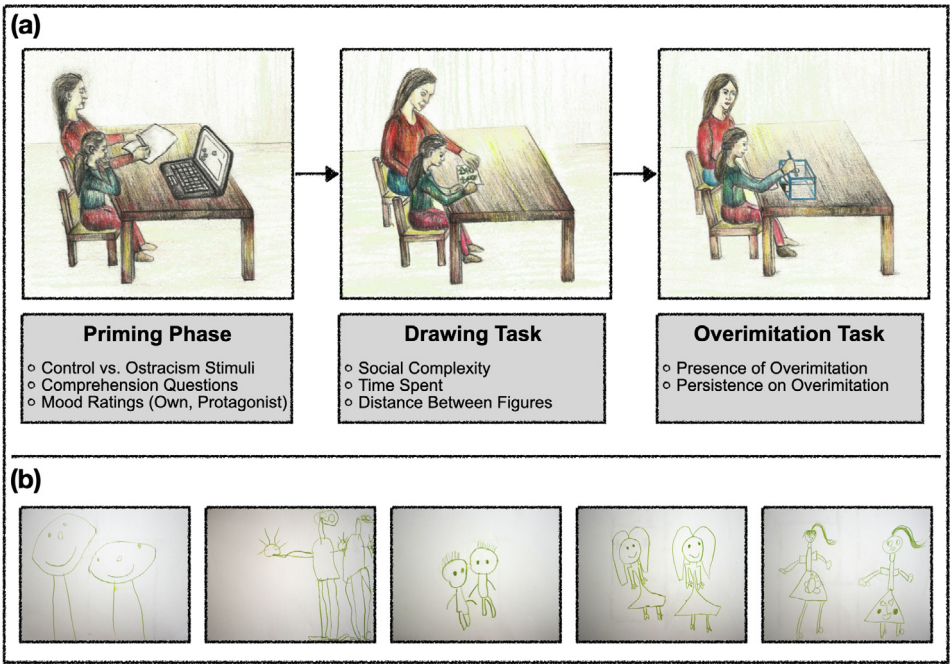

Fig. 1. Overview of the study. (A) Study phases. The three experimental phases are depicted, including the variables assessed during these phases. (B) Exemplary drawings composed during the study.

to sit down on a chair next to the laptop. E sat next to the child and said, "I have to write something down. In the meantime, you can watch a video." After the first video, E stated, "Oh, the video ended! Can you tell me what happened in the video [and show on the screen of the laptop]?" When the child explained what had happened in the video, E continued, "Can you tell me what happened to him/her?" (pointing to the protagonist and adjusting the sex of the protagonist to the child's sex). Next, E took a 5-point Likert scale depicting emoticons of varying mimics and asked the child, "How to do you think he/she feels? You can show me by using this scale," while pointing to each point of the scale and labeling it as *very sad, a little said, okay, a little happy,* or *very happy.* After the child's response, E asked the child to state his or her own mood, "Can you tell me how you feel? You can show me by using this scale," using a similar emoticon scale. The same procedure was repeated for the second video.

Drawing task

After the priming phase, E took the laptop aside and handed over a sheet of paper and a pen. E stated, "Now it is time to draw. You can draw yourself and your friend." If the child asked which friend he or she should draw, E suggested "whichever friend you want" (note that the term for "friend" was adapted to the child's sex in accordance with Serbian language). The child was given time to draw until the child stated that he or she had finished the drawing. E asked about the identity of each figure in the drawing before proceeding with the overimitation task.

Overimitation task

Next, E put a transparent puzzle box on the table next to her. She took a sticker and put it in an indentation at the front side of the box behind a small fabric. Next, she took a wooden stick from the top hole of the box and used the stick to clap her palm twice. She then put the stick through a top hole in the box to hit a panel twice, used the stick to circle the box twice, and lifted the fabric using the stick to receive the sticker from beneath. E exclaimed "Oh, a sticker!" and put the sticker next to

her. E returned the wooden stick to the original position, put a new sticker in the indentation, and modeled the whole procedure again. Following this modeling phase, E told the child, "Now you can take the sticker." and pushed the box next to the child. If the child asked any question on what he or she should do, E added, "You can take the sticker however you want."

After the child retrieved the sticker, E showed a debriefing video in which all shapes were playing together and ensured that the child left testing with a positive mood.

Coding and reliability

We strictly applied the coding schemes described by Song et al. (2015) to code children's evaluations and immediate reactions to the priming videos and their drawings. To code children's overimitation, we applied the coding scheme described by Stengelin et al. (2019). E transcribed children's utterances and coded children's behaviors for all tasks. To estimate the reliability of our coding, a second native Serbian coder, who was blind to hypotheses, community, and condition, coded 30% of the data. All data and scripts are available as online supplementary material.

Priming phase: Comprehension questions

Children's attribution of ostracism to the priming videos was coded on a scale from 0 to 2. Children were given a score of 2 if they claimed that a group of shapes did not want to play with the protagonist shape or that the group of shapes did not accept the protagonist shape (i.e., statements clearly denoting ostracism). Children were given a score of 1 if they stated that the protagonist was alone, played all by itself, or was sad. Finally, children were given a score of 0 if they did not mention any aspect of ostracism taking place in the videos. Interrater agreement was good (Cohen's κ = .86). Following Song et al. (2015), we calculated a mean comprehension score across the two priming videos that children watched during this phase.

Priming phase: Mood ratings

Children's utterances regarding the protagonist's mood and their own mood were ranked from 0 to 4 (0 = *very sad,* 1 = *a little sad,* 2 = *okay,* 3 = *a little happy,* 4 = *very happy*). Interrater agreement was excellent ($\kappa_{\text{protagonist}}$ = .96; κ_{child} = 1).

Drawing task: Social complexity of drawings

All body parts drawn by children (hair, nails, fingers, head, body, eyes, ears, legs, etc.) were counted as an index of the social complexity of children's drawings. For example, if a child drew at least one arm, the child was given a score of 1 for the category "arm". Overall, the social complexity of children's drawings could receive a score ranging from 0 to 23. Interrater agreement was excellent (κ = .92).

Drawing task: Time spent on drawings

The time that children spent on composing their drawings was coded in seconds. Interrater agreement was perfect (κ = 1). To run the analyses, this variable was transformed into minutes.

Drawing task: Distance between figures

We coded the smallest horizontal distance between the two figures (in millimeters). If the two figures overlapped (e.g., holding hands), children were given a score of 0 (n = 22). If children drew only one figure (n = 3), they were given the score of the biggest distance in the dataset plus 1 mm (following Song et al., 2015). If children drew more than two figures, we scored them according to the distance between the two closest figures (n = 2). Interrater reliability was excellent (κ = .89).

Overimitation task

Children received a score from 0 (*no overimitation*) to 7 (*perfect overimitation*) based on whether and how precise they copied the causally irrelevant actions as modeled by E (see Stengelin et al., 2019, for the detailed coding information). Interrater agreement was excellent (κ = .88).

Data analyses

All statistical analyses were conducted in R (R Development Core Team, 2019). For each analysis, we ran a preanalysis in which we tested whether children who had siblings ($n_{Kostolac}$ = 31/45; $n_{Pozarevac}$ = 39/46; $n_{Belgrade}$ = 26/36) would differ from single children. This was not evident for any of the analyses (all *p*s > .098), which is why we did not control for the presence of siblings in the analyses below.

We ran multiple linear models to investigate our hypotheses regarding the outcomes *comprehension questions, mood ratings, social complexity of drawings,* and *time spent on drawings.* To counteract inflation of Type I errors due to multiple testing, we compared the full models (comprising predictors and their interactions as well as control variables) with null models lacking the predictors (but not the controls) (see Forstmeier & Schielzeth, 2011) by using the *anova* function in R. In case such comparisons revealed statistically significant effects of the set of predictors, we proceeded with the analysis of the predictors. If so, we would report the statistical parameters in accordance with analyses of variance comprising the identical model structure as suggested by the linear models (see also the supplementary material for effect size estimates of the statistically significant predictors). In case the full–null model comparison would not indicate an effect of the predictors on the respective outcome, we would report the means and standard deviations for each level of the categorical predictors to illustrate the data.

Due to zero inflation in the outcome *distance between figures* (*n* = 25), we tested our hypothesis by running a zero-inflated model with negative binomial error structure using the *pscl* package (Jackman, 2017). In an additional preanalysis suggested by a reviewer, we investigated whether children's *comprehension* of ostracism during the priming phase (both generally and as an interaction with condition) would predict the outcome *distance between figures,* which was not the case, $\chi^2(4) = 2.43$, $p = .656$.

Again, we compared a full model (comprising the predictors of interest and their interactions as well as control variables) with a null model (comprising controls only) to avoid inflation of Type I error. For this purpose, we used a function provided by Roger Mundry in which the likelihood of both models is compared using a chi-square test (personal communication, August 3, 2016). If this comparison would reveal a statistically significant effect of the set of predictors, we would run separate likelihood ratio tests comparing full models with reduced models not comprising the predictor of interest to assess the statistical significance of the respective predictor. In case of a nonsignificant full–null model comparison, we would report the proportion of drawings with overlapping figures per level of the categorical predictors as well as the means and standard deviations of the distances between figures per categorical predictor to illustrate the data.

Furthermore, due to zero inflation in the outcome *overimitation* (*n* = 33), we tested this hypothesis by running a zero-inflated Poisson model using *pscl* (Jackman, 2017). In an additional preanalysis, we assessed whether children's comprehension of ostracism during the priming phase (both generally and selectively between conditions) would predict children's overimitation. Results revealed that such a link was not evident, $\chi^2(4) = 2.67$, $p = .615$.

In case of a statistically significant full–null model comparison (see above) (Forstmeier & Schielzeth, 2011), we would use the aforementioned function to assess the statistical significance of each predictor via likelihood ratio tests. If this test would not reveal statistical significance, we would indicate the proportion of children showing no overimitation separately for each level of the categorical predictors as well as the means and standard deviations of children's overimitation per categorical predictor.

For both linear models and zero-inflated models, we included condition and community as categorical predictors. Age (with two decimal digits) was standardized and also included as a predictor in the analyses. All models included sex as a control variable to gain model estimates for the predictors that are independent of children's sex. We did so because differences between boys and girls have been documented for both children's drawings (Song et al., 2015) and their overimitation (Frick et al., 2017; Schleihauf, Pauen, & Hoehl, 2019). As a first step, we tested the statistical significance of the two-way interactions between all predictors within each analysis (i.e., condition, community, and age). If two-way interactions did not indicate statistical significance, we analyzed models comprising main effects of the respective predictors.

To finally estimate the link between *distance between figures* and *overimitation,* we tested for a Spearman rank correlation between the two outcomes.

Results

Priming phase: Comprehension questions

A full–null model comparison revealed that the predictors had a statistically significant effect on children's comprehension of exclusion in the video stimuli, $F(9, 117) = 4.96$, $p < .001$. Only the two-way interaction between condition and age indicated statistical significance ($p = .004$). Thus, we ran a reduced model comprising this interaction and the main effect of community.

The results of this analysis indicated that, with increasing age, children became more likely to understand that the videos shown in the ostracism condition depicted social exclusion, $F(1, 121) = 8.44$, $p = .004$ (see Fig. 2A). Children's comprehension of ostracism did not vary across the three communities, $F(2, 121) = 0.97$, $p = .383$.

Priming phase: Mood ratings

The full–null comparison did not reveal an effect of the predictors on children's ratings of their own mood, $F(9, 117) = 0.77$, $p = .641$. As such, we did not proceed with a targeted analysis of the predictors condition ($M_{ostracism} = 3.21$, $SD = 0.85$; $M_{control} = 3.30$, $SD = 0.68$) and community ($M_{Kostolac} = 3.38$, $SD = 0.70$; $M_{Pozarevac} = 3.17$, $SD = 0.80$; $M_{Belgrade} = 3.22$, $SD = 0.81$) (see Fig. 2B).

In contrast, a full–null model comparison suggested that the predictors had a statistically significant effect on children's ratings of the protagonist's mood, $F(9, 117) = 2.08$, $p = .037$. There was no significant two-way interaction between the predictors on children's ratings of the protagonist's mood. Thus, we ran models comprising the main effects of the predictors condition, community, and age to assess children's *mood ratings* regarding themselves and the protagonist.

This analysis suggested that children in the control condition rated the protagonist's mood as better ($M = 2.02$, $SD = 1.20$) than children in the ostracism condition ($M = 1.30$, $SD = 1.22$), $F(1, 122) = 11.45$, $p = .001$ (see Fig. 2C). There was no statistically significant effect of community, $F(2, 122) = 1.21$, $p = .303$, or age, $F(1, 122) = 0.16$, $p = .691$, on the outcome.

Drawing task: Social complexity of drawings

The full–null model comparison indicated that the predictors had a statistically significant effect on the *social complexity of children's drawings,* $F(9, 109) = 4.97$, $p < .001$. None of the two-way interactions

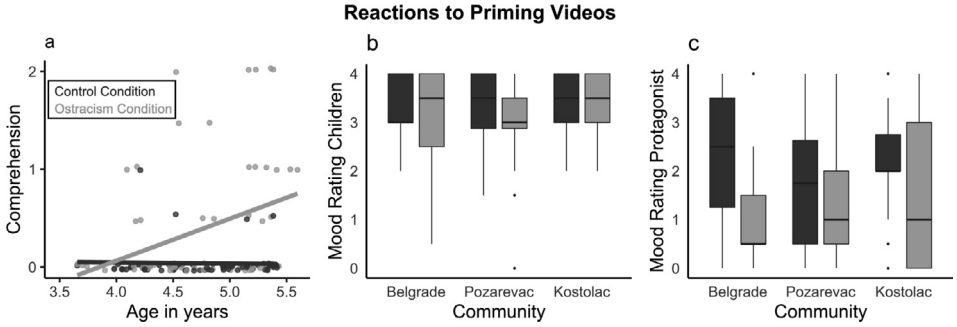

Fig. 2. Children's comprehension of the priming videos. (A) children's ascription of social exclusion taking place in the video across conditions and age. (B) Children's ratings of their own mood across conditions and communities. (C) Children's ratings of the protagonist's mood across conditions and communities.

reached statistical significance. Thus, we ran a model comprising the main effects of the predictors condition, community, and age on the outcome.

Children in the control condition tended to compose more socially complex drawings (M = 7.72, SD = 2.75) than those in the ostracism condition (M = 6.95, SD = 2.46), $F(1, 114) = 3.90$, $p = .051$ (see Fig. 3A), although this effect did not reach the threshold of statistical significance. With increasing age, children composed more socially complex drawings, $F(1, 114) = 24.27$, $p < .001$, estimate ± SE = 1.10 ± 0.20. Children across communities did not differ significantly with regard to the social complexity of their drawings, $F(2, 114) = 0.83$, $p = .439$.

Drawing task: Time spent on drawings

The full–null model comparison did not reveal a statistically significant effect of the predictors on the outcome *time spent on drawings*, $F(9, 110) = 1.53$, $p = .147$. Thus, we refrained from proceeding with a detailed analysis of the effects of the individual predictors condition ($M_{ostracism}$ = 2.00, SD = 1.54; $M_{control}$ = 1.89, SD = 1.31), community ($M_{Kostolac}$ = 1.83, SD = 1.42; $M_{Pozarevac}$ = 1.60, SD = 1.09; $M_{Belgrade}$ = 2.51, SD = 1.64) (see Fig. 3B), and age.

Drawing task: Distance between figures

The full–null model comparison did not lend support for a statistically significant effect of the predictors on *distance between figures* in children's drawings, $\chi^2(18) = 21.78$, $p = .242$. As such, we did not proceed with detailed analyses of the predictors. In the ostracism condition, 15.3% of children drew overlapping figures, whereas 26.2% of children in the ostracism condition did so. Furthermore, 17.1% of children in Kostolac, 20.5% in Pozarevac, and 25.7% in Belgrade drew overlapping figures. For the remaining children, distances between figures did not vary across conditions ($M_{ostracism}$ = 22.54, SD = 25.32 [see also supplementary material for an additional analysis regarding the absence of this effect]; $M_{control}$ = 17.02, SD = 21.64), communities ($M_{Kostolac}$ = 17.79, SD = 24.58; $M_{Pozarevac}$ = 20.34, SD = 22.27; $M_{Belgrade}$ = 22.15, SD = 25.02) (see Fig. 3C), or age.

Overimitation task

A full–null model comparison did not reveal a statistically significant effect of the predictors on children's *overimitation*, $\chi^2(18) = 21.06$, $p = .276$. As such, we did not proceed with a detailed analysis of the individual predictors. Here, 27.4% of children in the ostracism condition did not show any overimitation, whereas 25.8% did so in the control condition. Moreover, 27.9% of children in Kostolac, 22.7% in Pozarevac, and 29.7% in Belgrade did not show any overimitation. Of those children who did show some overimitation, no systematic variation was observed across conditions ($M_{ostracism}$ = 3.49,

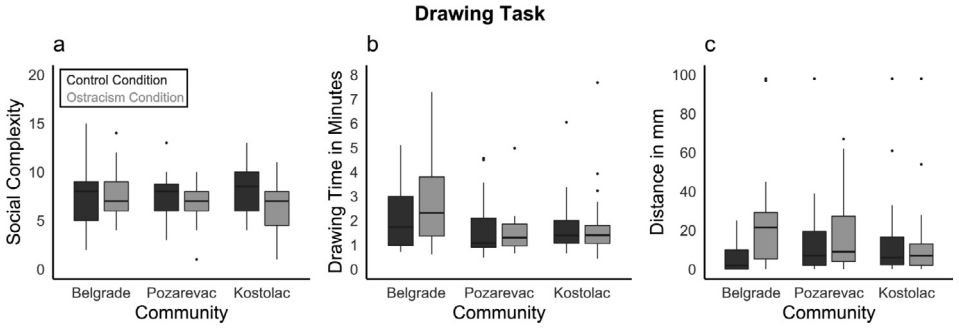

Fig. 3. Children's behaviors during the drawing task across conditions and communities. (A) Social complexity of children's drawings. (B) Time spent on drawings. (C) Distance between figures.

SD = 1.34; $M_{control}$ = 3.96, *SD* = 1.44) (see also supplementary material) or communities ($M_{Kostolac}$ = 3.52, *SD* = 0.96; $M_{Pozarevac}$ = 4.03, *SD* = 1.60; $M_{Belgrade}$ = 3.58, *SD* = 1.55).

Explorative analysis

In an explorative analysis, which was put forward by a reviewer and inspired by the dual-process model of overimitation (Schleihauf & Hoehl, 2020), we dissected children's overimitation into three distinct actions: tapping the stick on the palm of the hand, inserting the stick into the top hole, and circling the box with the stick. According to the dual-process model of overimitation, children's overimitation is shaped by two processes that are triggered by characteristics of the actions modeled. Being confronted with actions involving physical contact with the target object (coined *pseudo-instrumental actions* by Schleihauf & Hoehl, 2020), children may engage in blanket copying because they are cognitively biased to ascribe a causal function to the modeled action. In the current paradigm, inserting the stick into the top hole of the device may present such a pseudo-instrumental action. According to this framework, the overimitation of pseudo-instrumental actions is insensitive to social influences and reflects cognitive biases rather than affiliative motivations (Schleihauf & Hoehl, 2020). Pseudo-instrumental actions are contrasted by *noncontact actions,* which do not involve any physical contact with the target object. Because the causal irrelevance of these actions for achieving any instrumental goal is overt, noncontact actions are considered sensitive for social influences and thus may reflect affiliative motivations. In the current paradigm, tapping the palm of the hand with the stick can be conceived as a *body-directed noncontact action.* Moreover, circling the device with the stick presents a *noncontact action directed at a reward container.*

In light of the current study, one may predict that children's affiliative motivations following third-party ostracism may have facilitated their overimitation of *noncontact actions* at higher degrees than their overimitation of *pseudo-instrumental actions.* To address this issue, we recoded the data into binomial variables for each action and ran generalized linear models with binomial error structures using the lme4 package (Bates, Mächler, Bolker, & Walker, 2015). These models comprised the same predictors and controls as the ones presented in the original analyses.

Full–null comparisons between the models revealed no statistically significant effects of the predictors on either the pseudo-instrumental action, $Deviance_{insert\ stick}(9) = 8.76$, $p = .460$, or the noncontact actions, $Deviance_{tap\ palm}(9) = 11.03$, $p = .274$, and $Deviance_{circle\ object}(9) = 6.46$, $p = .693$.

Distance between figures and overimitation

There was no statistically significant link between the *distance between figures* in children's drawings and their *overimitation* ($r_s = .08$, $p = .380$).

Discussion

The current study investigated 3–5-year-old children's affiliative reactions to third-party ostracism in three diverse Serbian communities. More specifically, we assessed children's comprehension of ostracism depicted in the priming stimuli as well as their emotional and affiliative reactions to these primes using multiple methods. The three main findings of our investigation are as follows. First, with increasing age, children indicated a more sensitive comprehension of vicarious ostracism being depicted in the video stimuli. Although they ascribed more negative emotions to the ostracized protagonist than to protagonists who did not experience ostracism, their own mood was unaffected by condition. Second, Serbian children, in contrast to those among more socially independent Western populations (Marinović et al., 2017; Over & Carpenter, 2009; Song et al., 2015), did not show increased affiliation following primes depicting ostracism as compared with control stimuli. That is, children neither drew more socially complex figures nor spent more time composing their drawings depending on condition. Most substantially, both the distance between figures in children's drawings and affiliative overimitation did not vary across conditions. Third, the distance between figures in children's

drawings was not linked to their overimitation, raising doubt on the claim that both reflect an identical need for affiliation.

The current results highlight the importance of enculturation for shaping young children's reactions to ostracism (Over & Uskul, 2016; Uskul & Over, 2017). It appears that children's *comprehension* of third-party ostracism develops from 3 to 5 years of age across diverse contexts varying in their cultural emphasis on social interdependence. In accordance with children from more socially independent societies (Hwang & Markson, 2020; Song et al., 2015), Serbian children's comprehension of third-party ostracism increased throughout the preschool years. As such, this phase marks an important period during which children's understanding of ostracism is consolidated. Interestingly, children across this age range readily ascribe negative emotional consequences to individuals being excluded. Thus, it is possible that an implicit understanding of the negative consequences of ostracism on individuals' emotional well-being may already be influential even before children can reliably verbalize ostracism taking place in their environment.

Interestingly, children's ascription of ostracism being depicted in the video stimuli did not predict either their affiliative drawings or their overimitation. That is, we found no evidence that Serbian children's capacity to comprehend ostracism would actuate subsequent affiliative behaviors. Thus, this finding adds to previous work in which young preschoolers from socially independent U.S. backgrounds were capable of detecting ostracism in a ball-tossing game but did not prefer inclusive agents over exclusive (or neutral) ones (Hwang & Markson, 2020). The divergence of children's *comprehension* of and *responding* to ostracism in the current study indicates that both phenomena may be driven by developmentally distinct processes that might be differently affected by cultural values.

Whereas the current results indicate little cultural variation in children's *comprehension* of ostracism, they suggest that cultural values on social interdependence and independence essentially shape children's *responding* to third-party ostracism such as their perceived social pain and their affiliative reactions (Over & Uskul, 2016; Uskul & Over, 2017). Whereas studies conducted among children from societies emphasizing social independence, such as the United States and Western Europe, robustly document promoted affiliative behaviors after observing third-party ostracism (Marinović et al., 2017; Over & Carpenter, 2009; Song et al., 2015; Watson-Jones et al., 2014), this effect appears to be less pronounced (if not absent) in socially interdependent contexts such as the Serbian communities observed in this study.

Following Uskul and Over (2017), different explanations may account for the absence of affiliative reactions to third-party ostracism in children from socially interdependent societies. For example, children enculturated within socially interdependent contexts may be particularly equipped to overcome the threat of ostracism by relying on their prevailing social networks. Accordingly, ostracism primes would be *perceived* as equally threatening across societies, but children may *respond* differently by using and activating denser social networks with better cognitive accessibility. Although this argument may adequately explain the low levels of social pain described by socially interdependent children in the study by Over and Uskul (2016), it is unclear whether it also accounts for the current results. If children from more socially interdependent contexts would buffer themselves against ostracism by focusing on prevailing social relationships, such tendencies should have been indicated in the drawings depicting them and their friends (e.g., drawing both characters closer together). Instead, our results in this task suggested no increased reliance on their friendship relations following the ostracism primes (see also supplementary material for a descriptive comparison of the distance between figures in the current study with the data described in Song et al., 2015).

An alternative explanation put forward by Uskul and Over (2017) holds that ostracism may already be *perceived* as less threating in societies emphasizing social interdependence. In the current study, children understood that an ostracized protagonist would feel sad. At the same time, these children did not adopt the protagonist's mood but described themselves to be happy instead. This finding indicates that children did not perceive the stimuli as threatening per se, which may be why they did not respond with increased affiliation. Interestingly, this finding mirrors findings among children from more socially independent contexts. For example, German children have also been found not to adopt the negative emotions they ascribe to victims of social exclusion (Song et al., 2015). Interestingly, this pattern has also been reported for adults' reactions to ostracism more generally (Twenge, Baumeister, Tice, & Stucke, 2001; Twenge, Catanese, & Baumeister, 2003). As such, it is rather implausible that

children's affiliative responses to vicarious ostracism, as observed among socially independent societies, are actuated merely through a change in children's own mood.

Another possibility is that the proxies used to assess affiliation in the current study are suboptimal proxies for affiliation among socially interdependent societies. Accordingly, neither children's drawings nor their overimitation would reflect children's affiliative motivations. The current finding that both proxies were not linked on an individual level is in favor of this notion. However, previous studies suggest that both proxies are cross-culturally valid. In the study by Over and Uskul (2016, Study 3), the researchers used the distance between figures in children's drawings to assess children's social interdependence. Here, the distance between figures served to study cross-cultural differences rather than state-like differences in children's motivation to affiliate. Yet, this approach indicates that children's drawings convey valid information on their perception of social relationships. In a study by Stengelin et al. (2019), children from three diverse societies overimitated a model selectively in the experimenter's presence, denoting a cross-culturally recurrent affiliative motivation in overimitation. Thus, these studies suggest that the proxies for affiliation assessed in this study can be applied to communities outside urban Western populations. However, because none of these studies has assessed these tasks among Serbian preschoolers, we can only speculate on how both proxies for affiliation translate to children from this country.

When interpreting these results, it is also important to note that children's responses to ostracism may also vary along with other variables besides social interdependence. For example, Watson-Jones et al. (2016) reported a pronounced effect of whether children are excluded by members of their ingroup or their outgroup. Interestingly, a study among socially interdependent farmers and more independent herder communities in Turkey indicated systematic variation in adults' responses to ostracism by either strangers or close individuals (Uskul & Over, 2014). In this study, the more interdependent farmers responded to ostracism less strongly than herders only when ostracism was depicted by strangers. If participants were exposed to ostracism by close others, both populations did not vary systematically.

These findings suggest that socially interdependent societies may buffer individuals from social exclusion by strangers and outgroup members. The exact mechanisms underlying these links are still a topic of scientific debate. In light of the current study, one may argue that the shapes presented to children during the priming phase were perceived as an outgroup or strangers as opposed to close individuals. Hence, the current manipulation might not have been relevant enough to actuate children's affiliative responses in this society. In future studies, a more direct involvement of children in the manipulation of ostracism (e.g., being excluded from ingroup members in a virtual ball-tossing game; see Watson-Jones et al., 2016) may reveal more pronounced effects of ostracism on affiliation. Furthermore, the assessment of children's affiliative responses following ostracism may also benefit from a more facilitated manipulation of group membership. For instance, children could be asked to draw themselves and a member of their sports team or class to facilitate affiliation with their ingroup. The assessment of children's overimitation could also be framed accordingly such as by introducing the adult model as a member of the child's ingroup and referring to group norms in this context (Schleihauf et al., 2019). Implementing such procedures may allow for a more nuanced investigation of the mechanisms underlying the ontogenetic interplay of social interdependence and children's reactions to ostracism.

Interestingly, age neither predicted the distance between figures in children's drawings nor predicted children's overimitation. This pattern opposes previous studies on children's affiliative reactions to ostracism in which children's affiliation reportedly increased with age (Song et al., 2015; Watson-Jones et al., 2014). Song et al. (2015) reported an interaction between condition and age on the distance between figures in children's drawings. That is, children tested in the ostracism condition became more likely to draw overlapping figures as they grew older, whereas such a shift was absent among those who were exposed to control stimuli instead. In combination with the absence of such an interaction in the current study, one may argue that children's affiliative reactions to the threat of ostracism emerge throughout the preschool years under the influence of cultural values emphasizing social independence. If so, researchers in future studies will need to attenuate broad generalizations beyond such contexts to account for the impact of culture on shaping children's reactions to ostracism.

Moreover, the absence of a developmental increase in children's overimitation stands in stark contrast with previous work on children's affiliative imitation in response to ostracism (Watson-Jones et al., 2014) and on overimitation more generally (Clay et al., 2018; McGuigan, Makinson, & Whiten, 2011; Stengelin et al., 2019; but see Stengelin, Hepach, & Haun, 2020). The current results neither indicate a general age-related increase in children's overimitation nor indicate a selective effect of age in the ostracism condition. Notably, the explorative analysis of the dissected elements of the overimitation task also failed to reveal a developmental increase in children's overimitation. In combination, these findings suggest developmental stability in overimitation among Serbian preschoolers (see also Frick et al., 2017, for a similar finding).

This result adds to a growing debate regarding the developmental trajectories underlying children's overimitation, with some studies indicating developmental stability (Nielsen & Tomaselli, 2010; Stengelin et al., 2020) and others reporting age-related increases across the preschool years and beyond (Clay et al., 2018; McGuigan et al., 2011; Stengelin et al., 2019). Systematic investigations of the potential drivers of this heterogeneity, which may be grounded in methodological details or cultural variables, are greatly needed to shed light on the developmental origins of the phenomenon.

Across tasks and measures, children from all three communities did not differ markedly in their affiliative responses to ostracism. These results indicate that community size might not be essential in shaping either young children's comprehension of ostracism or their affiliative responses to it. Originally, we decided to assess children from different-sized communities in order to ensure within-societal variation in social interdependence (Cha, 1994; Freeman, 1997; Georgas, 1989). However, we stress that such variation should be conceived as being more in degree than in kind. One may even argue that the link between urbanization and cultural values (e.g., social interdependence) may, as of today, be rather negligible in the communities assessed here. Modern media, including television, books, and the internet, allow cultural values to spread and converge fluently within and across societies regardless of community sizes. Because we did not assess ethnographic information separately for each community or children's families regarding cultural values on social interdependence, we can only speculate on this issue.

Interestingly, we did not observe a link between the distance between figures in children's drawings and children's overimitation. This finding contradicts past research in which both measures have been assumed as proxies for young children's affiliative motivations (Marsh et al., 2019; Nielsen & Blank, 2011; Song et al., 2015; Stengelin et al., 2019; Watson-Jones et al., 2016). It is plausible that these proxies reflect a mixture of different motivations and biases, making it difficult to unravel specific links between the two. For instance, children's tendency to overimitate has also been discussed with regard to cognitive bias (Lyons et al., 2007; Whiten et al., 2016), normative bias (Keupp et al., 2013), and conformist bias (DiYanni et al., 2015; see Hoehl et al., 2019, for a review), which may depend on action characteristics (Schleihauf & Hoehl, 2020). Here, the model remained present and attentive when children were given the turn to overimitate. Such protocols have previously been found to foster overimitation (Marsh et al., 2019; Nielsen & Blank, 2011; Stengelin et al., 2019), denoting an affiliative motivation underlying the phenomenon. However, this does not imply that other biases may have been relevant in the current study.

Notably, the overimitation task presented here deviates from imitation tasks previously used to assess children's reactions to ostracism (Hopkins & Branigan, 2020; Over & Carpenter, 2009; Watson-Jones et al., 2014, 2016). Here, we introduced a task in which an instrumental goal of the modeled actions was evident (i.e., retrieving a sticker) and even emphasized by the model (i.e., "Now you can take the sticker"). We did so to better capture children's affiliative motivations and tease apart affiliative motivations from other drivers of overimitation. Previous research has shown that goal demotion actuates overimitation because it induces a ritual stance among young children (Nielsen, Tomaselli, & Kapitány, 2018). As such, an overimitation task lacking instrumental goals may make it difficult to parse normative considerations on children's overimitation (Keupp et al., 2013) from merely affiliative ones. Previous work has also documented that instrumental instructions, rather than conventional ones, are well-suited to capture cultural variation in children's overimitation (Clegg & Legare, 2016). To account for these concerns, we introduced an overimitation task with an evident instrumental goal as a culturally sensitive proxy of children's affiliation. Although an initial

study by Yu and Kushnir (2020) denoted a trait-like disposition to underlie children's overimitation across tasks, cross-cultural evidence in this regard is still lacking.

Thus, although we conclude that mingling different phenomena as proxies for a common psychological disposition should only be made with caution, we also stress that future studies are highly needed to shed light on the (multifaceted) motivations and cognitive underpinnings of children's affiliative behaviors.

In the current study, we focused on whether the link between ostracism and children's affiliative behaviors, which has been observed in socially independent societies, recurs among children in a socially interdependent society. In the first part of our procedure, we directly replicated the study by Song et al. (2015) in three diverse communities within a socially interdependent society. Following this replication, we proceeded with an overimitation task as a second proxy for children's affiliation. Although this approach allows for an ideal comparability of the first (drawing) phase of the study, it certainly limits conclusions drawn from the second (overimitation phase). Given the fixed sequence of tasks in the current study, we cannot rule out that children's experience throughout the replication phase may have altered their behavior during the overimitation task. It is plausible that children's exposure to the drawing task may have phased their affiliative motivations across conditions, potentially concealing effects of the ostracism primes on children's overimitation. As such, the results of the overimitation task require further replication from independent studies or such in which the different assessments of affiliation are introduced in a counterbalanced order.

Another limitation of the current study is that children's experience of vicarious ostracism was depicted using arbitrary shapes that were only displayed on a laptop screen. Although children recognized the content of these primes, they may have had little inclination to translate the protagonist's situation to themselves. In real life, preschoolers may increasingly face social exclusion both from the side of the excluding party and as the individual being excluded. The current priming stimuli deviated considerably from the dynamic experience children gain around the preschool years. Thus, first-hand experience of social exclusion may be a necessary next step to investigate. Doing so may induce much more pronounced affiliative responses than the vicarious ostracism assessed here.

Taken together, the current investigation presents evidence that, similar to socially independent Western societies, the capacity to conceive third-party ostracism increases throughout the preschool ages among children from Serbia—a society in which social interdependence is given higher emphasis as compared with urban Western populations in which developmental research is typically conducted (Nielsen et al., 2017). At the same time, children across three Serbian communities did not respond to ostracism with increased affiliation, as indicated by their drawings and overimitation. Although the need to establish and maintain social relationships may indeed be cross-culturally recurrent, the way in which children manage and respond to social exclusion appears to be tied to the society in which they are enculturated.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jecp.2020.105019.

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